# Model Name: T420HVN01.1

## Issue Date : 2011/12/13

## ( )Preliminary Specifications
## (＊)Final Specifications

| Customer Signature | Date | AUO | Date |
|---|---|---|---|
| Approved By | | Approval By PM Director<br>Peter Chiu | |
| Note | | Reviewed By RD Director<br>Eugene CC Chen<br>Reviewed By Project Leader<br>Jimson Jeng | |
| | | Prepared By PM<br>Shelby | |

# Contents

# Record of Revision

| Version | Date | Page | Description |
|---|---|---|---|
| 0.0 | 2011/08/24 | | Pre-Spec First release |
| 0.1 | 2011/9/2 | 31 | Update Pin assignment |
| 0.2 | 2011/9/5 | 31 | Update Pin assignment |
| 0.3 | 2011/9/21 | 4 | Revise display color from 10bit to 8bit |
| 0.4 | 2011/9/29 | 17 | Revise Pin2~Pin5 |
| 0.5 | 2011/11/28 | 6 | Update Power Supply Input Current |
| | | | Update Power Consumption |
| | | | Update Inrush Current |
| | | 28 | Update the packing method |
| | | | Update Pallet and Shipment Information |
| 0.6 | 2011/12/08 | 24/25 | Drawing update |
| 0.7 | 2011/12/13 | 16 | Update Electrical specification |
| | | 22 | Update Weight 8900 g |
| 1.0 | 2011/12/13 | | Final-Spec First release |
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# 1. General Description

This specification applies to the 42.0 inch Color TFT-LCD Module T420HVN01.1. This LCD module has a TFT active matrix type liquid crystal panel 1,920x1,080 pixels, and diagonal size of 42.0 inch. This module supports 1,920x1,080 mode. Each pixel is divided into Red, Green and Blue sub-pixels or dots which are arranged in vertical stripes. Gray scale or the brightness of the sub-pixel color is determined with a 8-bit gray scale signal for each dot.

The T420HVN01.1 has been designed to apply the 8-bit 2 channel LVDS interface method. It is intended to support displays where high brightness, wide viewing angle, high color saturation, and high color depth are very important.

*** General Information**

| Items | Specification | Unit | Note |
|---|---|---|---|
| Active Screen Size | 42.00 | inch | |
| Display Area | 930.24(H) x 523.26(V) | mm | |
| Outline Dimension | 960.4 (H) x 560.4 (V) | mm | |
| Driver Element | a-Si TFT active matrix | | |
| Bezel Opening | 938.6 (H) x 531.5 (V) | mm | |
| Display Colors | 8 bit | Colors | |
| Number of Pixels | 1,920x1,080 | Pixel | |
| Pixel Pitch | 0.4845 | mm | |
| Pixel Arrangement | RGB vertical stripe | | |
| Display Operation Mode | Normally Black | | |
| Surface Treatment | Anti-Glare, 3H | | Haze=2% |



# 2. Absolute Maximum Ratings

The followings are maximum values which, if exceeded, may cause faulty operation or damage to the unit

| Item | Symbol | Min | Max | Unit | Conditions |
|---|---|---|---|---|---|
| Logic/LCD Drive Voltage | $V_{DD}$ | -0.3 | 14 | $V_{DC}$ | Note 1 |
| Input Voltage of Signal | Vin | -0.3 | 4 | $V_{DC}$ | Note 1 |
| BLU Input Voltage | VDDB | -0.3 | 28 | $V_{DC}$ | Note 1 |
| BLU on/off Control Voltage | $V_{BLON}$ | -0.3 | 7 | $V_{DC}$ | Note 1 |
| BLU Brightness Control Voltage | Vdim | -0.3 | 7 | $V_{DC}$ | Note 1 |

Note 1: Duration: 50 msec.

# 3. Electrical Specification

The T420HVN01.1 requires two power inputs. One is employed to power the LCD electronics and to drive the TFT array and liquid crystal. The second input for BLU is to power inverter.

## 3.1 Electrical Characteristics

### 3.1.1: DC Characteristics

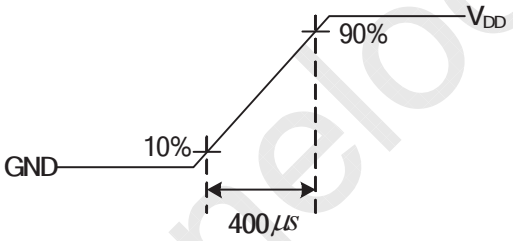
| Parameter | | Symbol | Value | | | Unit | Note |
|---|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max | | |
| LCD | | | | | | | |
| Power Supply Input Voltage | | $V_{DD}$ | 10.8 | 12 | 13.2 | $V_{DC}$ | |
| Power Supply Input Current | | $I_{DD}$ | -- | 1 | 1.2 | A | 1 |
| Power Consumption | | $P_C$ | -- | 12 | 1.44 | Watt | 1 |
| Inrush Current | | $I_{RUSH}$ | -- | -- | 4 | A | 2 |
| Permissible Ripple of Power Supply Input Voltage | | $V_{RP}$ | -- | -- | $V_{DD}$ * 5% | $mV_{pk-pk}$ | 3 |
| LVDS Interface | Input Differential Voltage | $\lvert V_{ID} \rvert$ | 200 | 400 | 600 | $mV_{DC}$ | 4 |
| | Differential Input High Threshold Voltage | $V_{TH}$ | +100 | -- | +300 | $mV_{DC}$ | 4 |
| | Differential Input Low Threshold Voltage | $V_{TL}$ | -300 | -- | -100 | $mV_{DC}$ | 4 |
| | Input Common Mode Voltage | $V_{ICM}$ | 1.1 | 1.25 | 1.4 | $V_{DC}$ | 4 |
| CMOS Interface | Input High Threshold Voltage | $V_{IH}$ (High) | 2.7 | -- | 3.3 | $V_{DC}$ | 5 |
| | Input Low Threshold Voltage | $V_{IL}$ (Low) | 0 | -- | 0.6 | $V_{DC}$ | 5 |
| Backlight Power Consumption | | $P_{BL}$ | -- | 45.18 | -- | Watt | |
| Life time (MTTF) | | | 30000 | | | Hour | 8,9 |

### 3.1.2: AC Characteristics

| Parameter | | Symbol | Value | | | Unit | Note |
|---|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max | | |
| LVDS Interface | Receiver Clock : Spread Spectrum Modulation range | Fclk_ss | Fclk -3% | -- | Fclk +3% | MHz | 5 |
| | Receiver Clock : Spread Spectrum Modulation frequency | Fss | 30 | -- | 200 | KHz | 5 |
| | Receiver Data Input Margin<br>Fclk = 85 MHz<br>Fclk = 65 MHz | tRMG | <br>-0.4<br>-0.5 | <br>--<br>-- | <br>0.4<br>0.5 | ns | 7 |

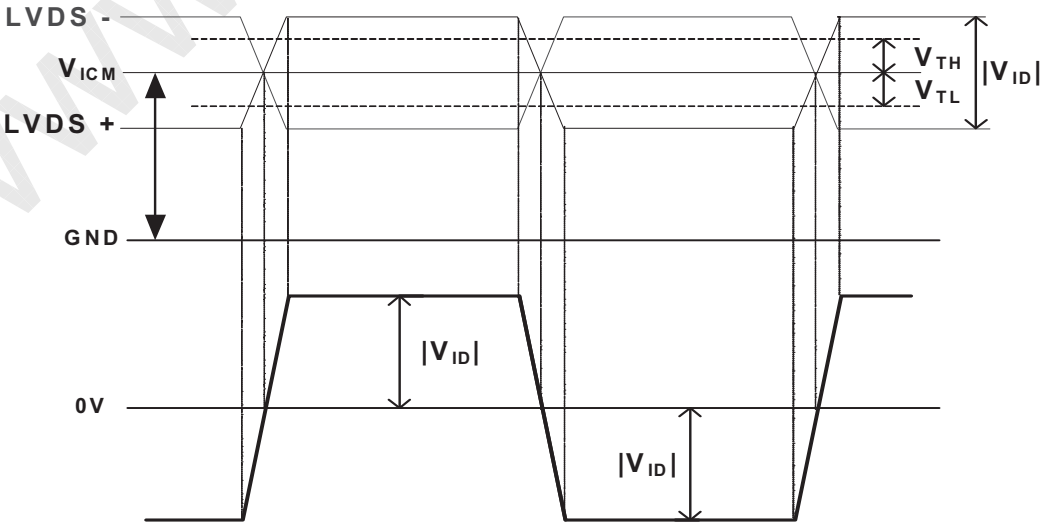
**Note :**

1. $V_{DD}$ = 12.0V, Fv = 60Hz, Fclk= 74.25MHz , 25 ℃, Test Pattern : White Pattern
2. Measurement condition : Rising time = 400us

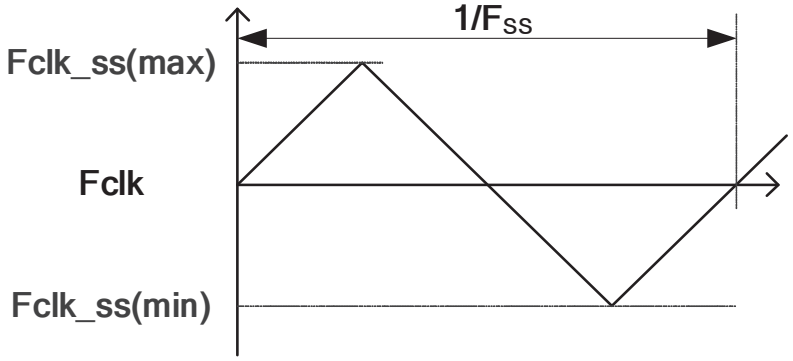



3. Test Condition:
   (1) The measure point of $V_{RP}$ is in LCM side after connecting the System Board and LCM.
   (2) Under Max. Input current spec. condition

4. $V_{ICM}$ = 1.25V



5. The measure points of $V_{IH}$ and $V_{IL}$ are in LCM side after connecting the System Board and LCM.
6. LVDS Receiver Clock SSCG (Spread spectrum clock generator) is defined as below figures

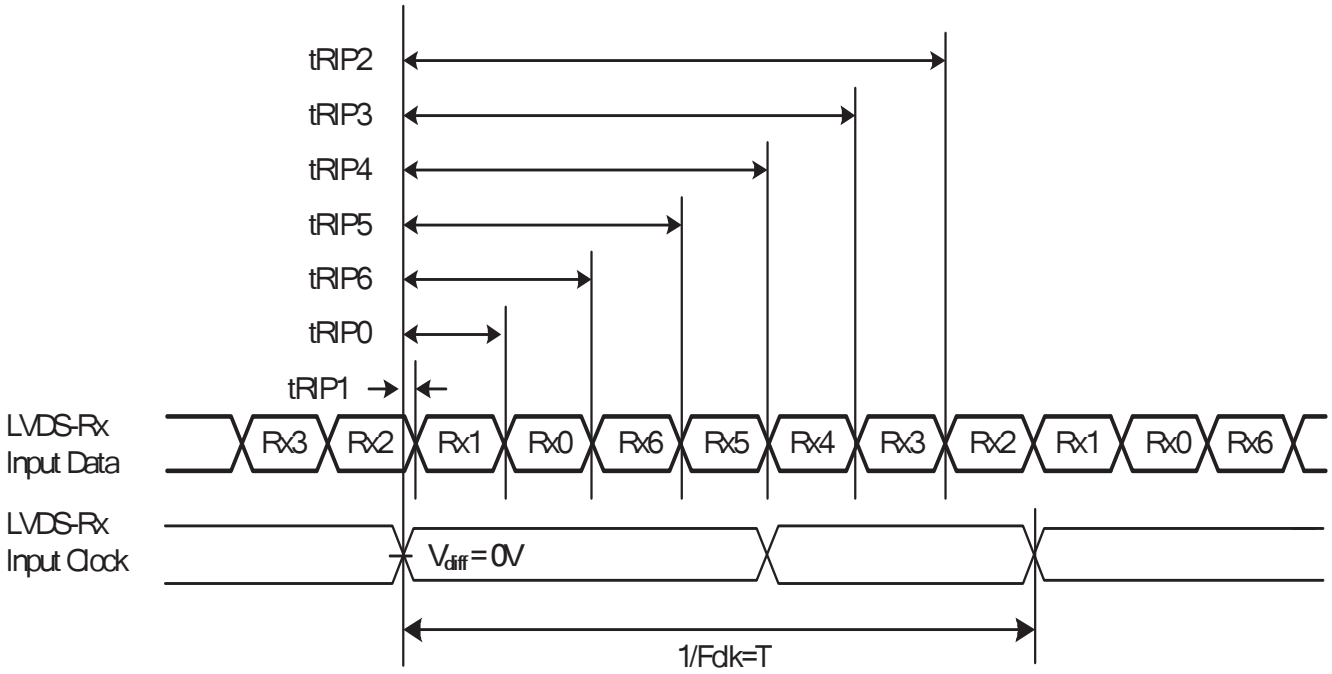




7. Receiver Data Input Margin

| Parameter | Symbol | Rating | | | Unit | Note |
|---|---|---|---|---|---|---|
| | | Min | Type | Max | | |
| Input Clock Frequency | Fclk | Fclk (min) | -- | Fclk (max) | MHz | **T=1/Fclk** |
| Input Data Position0 | tRIP1 | -\|tRMG\| | 0 | \|tRMG\| | ns | |
| Input Data Position1 | tRIP0 | T/7-\|tRMG\| | T/7 | T/7+\|tRMG\| | ns | |
| Input Data Position2 | tRIP6 | 2T/7-\|tRMG\| | 2T/7 | 2T/7+\|tRMG\| | ns | |
| Input Data Position3 | tRIP5 | 3T/7-\|tRMG\| | 3T/7 | 3T/7+\|tRMG\| | ns | |
| Input Data Position4 | tRIP4 | 4T/7-\|tRMG\| | 4T/7 | 4T/7+\|tRMG\| | ns | |
| Input Data Position5 | tRIP3 | 5T/7-\|tRMG\| | 5T/7 | 5T/7+\|tRMG\| | ns | |
| Input Data Position6 | tRIP2 | 6T/7-\|tRMG\| | 6T/7 | 6T/7+\|tRMG\| | ns | |




8. The relative humidity must not exceed 80% non-condensing at temperatures of 40℃ or less. At temperatures greater than 40℃, the wet bulb temperature must not exceed 39℃. When operate at low temperatures, the brightness of LED will drop and the life time of LED will be reduced.
9. The lifetime (MTTF) is defined as the time which luminance of LED is 50% compared to its original value. [Operating condition: Continuous operating at Ta = 25±2℃]

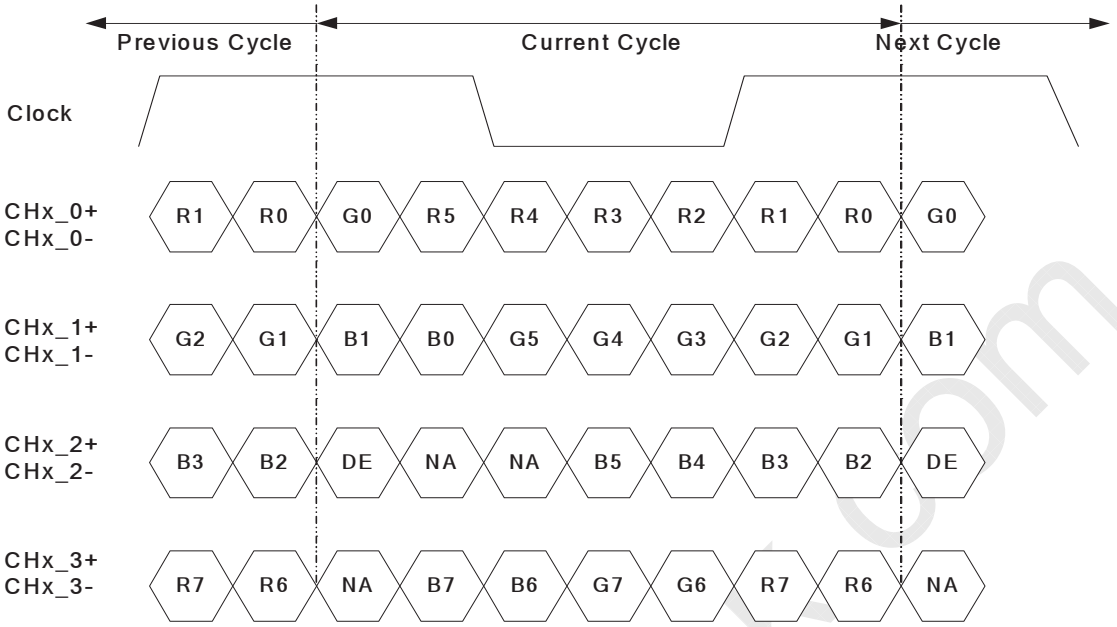
## 3.2 Interface Connections

- LCD connector: FI-RE51S-HF (JAE, LVDS connector)
- Mating connector:

| PIN | Symbol | Description | PIN | Symbol | Description |
|---|---|---|---|---|---|
| 1 | N.C. | No connection (Internal Open) | 26 | GND | Ground |
| 2 | N.C. | No connection | 27 | GND | Ground |
| 3 | N.C. | No connection | 28 | CH2_0- | LVDS Channel 2, Signal 0- |
| 4 | N.C. | No connection | 29 | CH2_0+ | LVDS Channel 2, Signal 0+ |
| 5 | N.C. | No connection | 30 | CH2_1- | LVDS Channel 2, Signal 1- |
| 6 | N.C. | No connection | 31 | CH2_1+ | LVDS Channel 2, Signal 1+ |
| 7 | LVDS_SEL | Open/High(3.3V) for NS, Low(GND) for JEIDA | 32 | CH2_2- | LVDS Channel 2, Signal 2- |
| 8 | N.C. | No connection (Internal Open) | 33 | CH2_2+ | LVDS Channel 2, Signal 2+ |
| 9 | N.C. | No connection | 34 | GND | Ground |
| 10 | GND | Ground | 35 | CH2_CLK- | LVDS Channel 2, Clock - |
| 11 | GND | Ground | 36 | CH2_CLK+ | LVDS Channel 2, Clock + |
| 12 | CH1_0- | LVDS Channel 1, Signal 0- | 37 | GND | Ground |
| 13 | CH1_0+ | LVDS Channel 1, Signal 0+ | 38 | CH2_3- | LVDS Channel 2, Signal 3- |
| 14 | CH1_1- | LVDS Channel 1, Signal 1- | 39 | CH2_3+ | LVDS Channel 2, Signal 3+ |
| 15 | CH1_1+ | LVDS Channel 1, Signal 1+ | 40 | N.C. | No connection |
| 16 | CH1_2- | LVDS Channel 1, Signal 2- | 41 | N.C. | No connection |
| 17 | CH1_2+ | LVDS Channel 1, Signal 2+ | 42 | GND | Ground |
| 18 | GND | Ground | 43 | GND | Ground |
| 19 | CH1_CLK- | LVDS Channel 1, Clock - | 44 | GND | Ground |
| 20 | CH1_CLK+ | LVDS Channel 1, Clock + | 45 | GND | Ground |
| 21 | GND | Ground | 46 | GND | Ground |
| 22 | CH1_3- | LVDS Channel 1, Signal 3- | 47 | N.C. | No connection |
| 23 | CH1_3+ | LVDS Channel 1, Signal 3+ | 48 | $V_{DD}$ | Power Supply, +12V DC Regulated |
| 24 | N.C. | No connection | 49 | $V_{DD}$ | Power Supply, +12V DC Regulated |
| 25 | N.C. | No connection | 50 | $V_{DD}$ | Power Supply, +12V DC Regulated |
| | | | 51 | $V_{DD}$ | Power Supply, +12V DC Regulated |

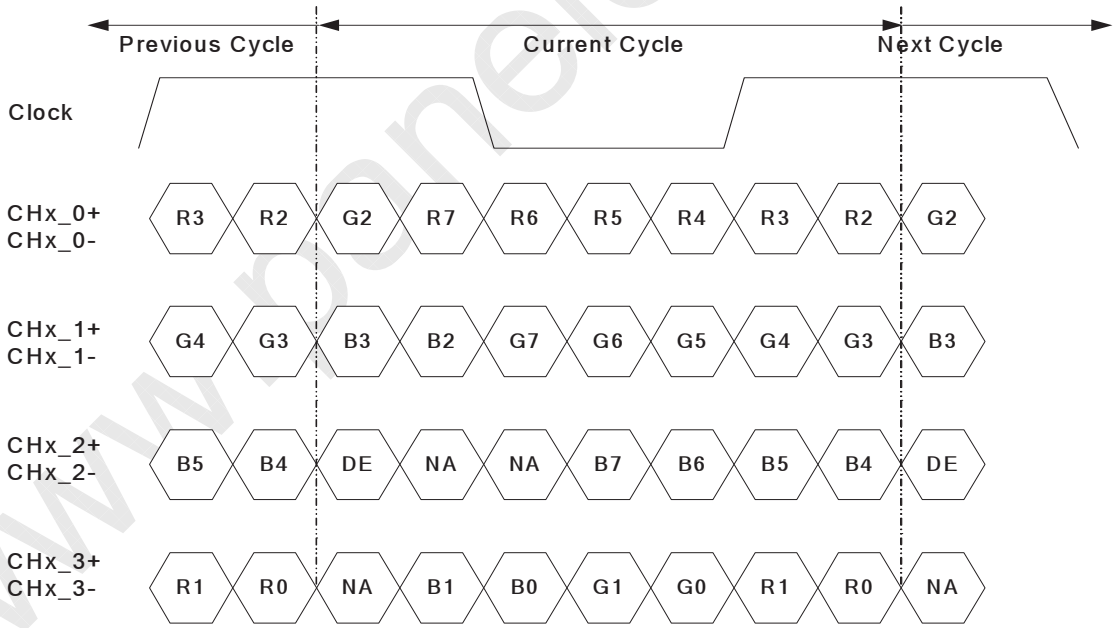
**Note: N.C. : please leave this pin unoccupied. It can not be connected by any signal (Low/GND/High).**

■ **LVDS Option = High/Open➔NS**




**Note: x = 1, 2, 3, 4…**

■ **LVDS Option = Low➔JEIDA**




**Note: x = 1, 2, 3, 4…**

## 3.3 Signal Timing Specification

This is the signal timing required at the input of the user connector. All of the interface signal timing should be satisfied with the following specifications for its proper operation.

### Timing Table (DE only Mode)

| Signal | Item | Symbol | Min. | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Vertical Section | Period | Tv | 1096 | 1125 | 1480 | Th |
| | Active | Tdisp (v) | | 1080 | | |
| | Blanking | Tblk (v) | 16 | 45 | 400 | Th |
| Horizontal Section | Period | Th | 1030 | 1100 | 1325 | Tclk |
| | Active | Tdisp (h) | | 960 | | |
| | Blanking | Tblk (h) | 70 | 140 | 365 | Tclk |
| Clock | Frequency | Fclk=1/Tclk | 50 | 74.25 | 82 | MHz |
| Vertical Frequency | Frequency | Fv | 47 | 60 | 63 | Hz |
| Horizontal Frequency | Frequency | Fh | 60 | 67.5 | 73 | KHz |

Notes:

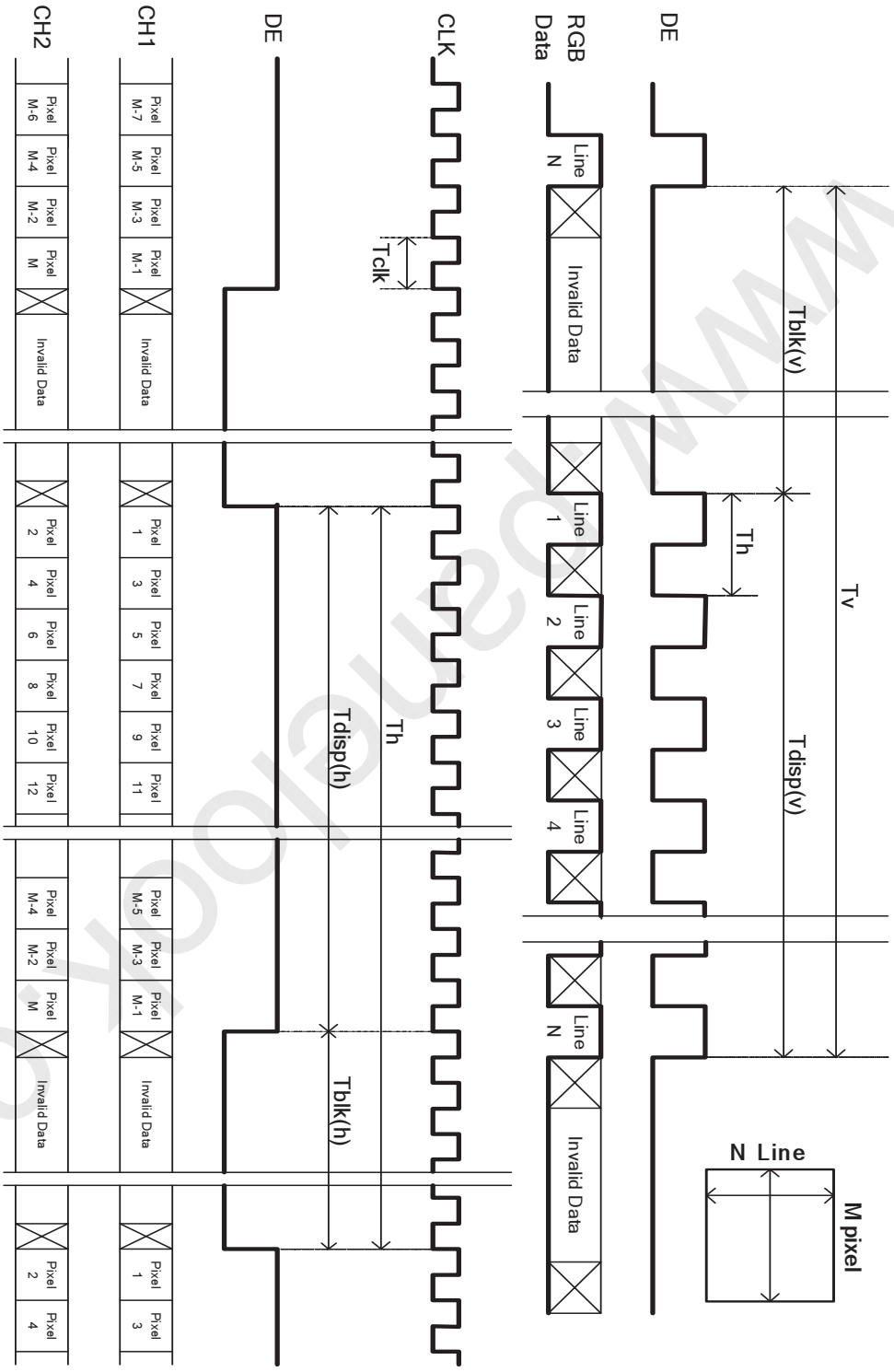
(1) Display position is specific by the rise of DE signal only.
Horizontal display position is specified by the rising edge of 1st DCLK after the rise of 1st DE, is displayed on the left edge of the screen.

(2)Vertical display position is specified by the rise of DE after a “Low” level period equivalent to eight times of horizontal period. The 1st data corresponding to one horizontal line after the rise of 1st DE is displayed at the top line of screen.

(3)If a period of DE “High” is less than 1920 DCLK or less than 1080 lines, the rest of the screen displays black.

(4)The display position does not fit to the screen if a period of DE “High” and the effective data period do not synchronize with each other.

## 3.4 Signal Timing Waveforms



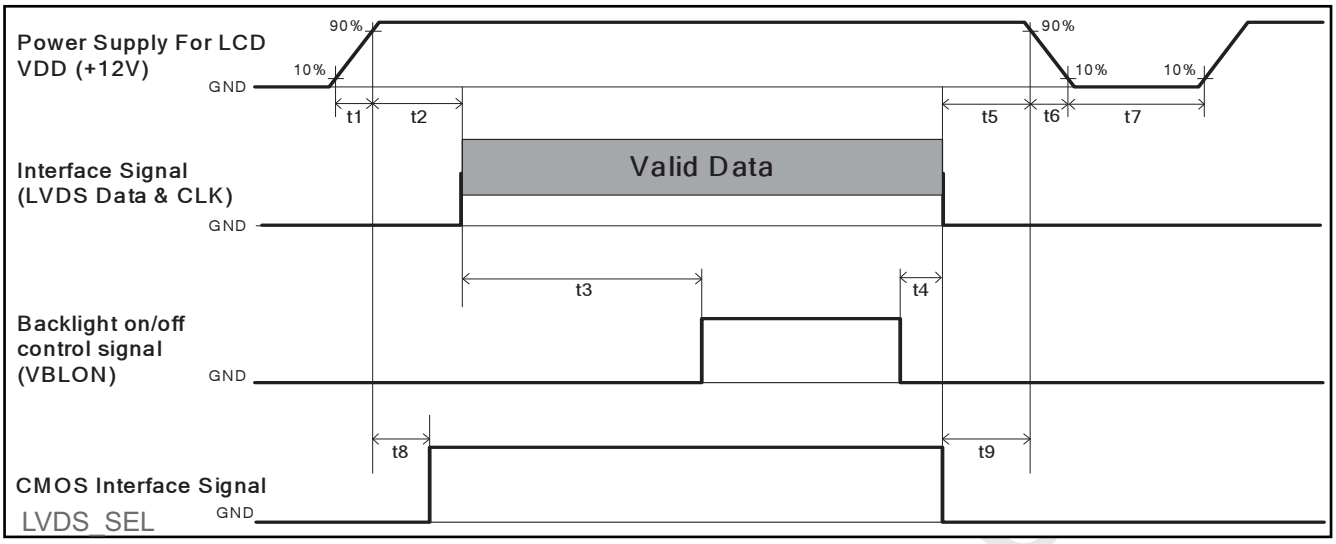
## Color Input Data Reference

The brightness of each primary color (red, green and blue) is based on the 8 bit gray scale data input for the color; the higher the binary input, the brighter the color. The table below provides a reference for color versus data input.

COLOR DATA REFERENCE

| Color | | Input Color Data | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | RED | | | | | | | | GREEN | | | | | | | | BLUE | | | | | | | |
| | | MSB | | | | | | | LSB | MSB | | | | | | | LSB | MSB | | | | | | | LSB |
| | | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
| Basic Color | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red(255) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(255) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue(255) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Cyan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Magenta | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Yellow | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | White | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| R | RED(000) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | RED(001) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ---- | | | | | | | | | | | | | | | | | | | | | | | | |
| | RED(254) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | RED(255) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| G | GREEN(000) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | GREEN(001) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ---- | | | | | | | | | | | | | | | | | | | | | | | | |
| | GREEN(254) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | GREEN(255) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| B | BLUE(000) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | BLUE(001) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | ---- | | | | | | | | | | | | | | | | | | | | | | | | |
| | BLUE(254) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| | BLUE(255) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

## Power Sequence for LCD




| Parameter | Values | | | Unit |
|---|---|---|---|---|
| | Min. | Type. | Max. | |
| t1 | 0.4 | --- | 30 | ms |
| t2 | 0.1 | --- | **150** | ms |
| t3 | **450** | --- | --- | ms |
| t4 | 0 *1 | --- | --- | ms |
| t5 | 0 | --- | --- | ms |
| t6 | --- | --- | --- *2 | ms |
| t7 | 500 | --- | --- | ms |
| t8 | 10 | --- | 50 | ms |
| t9 | 0 | --- | --- | ms |

**Note:**
**(1) t4=0 : concern for residual pattern before BLU turn off.**
**(2) t6 : voltage of VDD must decay smoothly after power-off. (customer system decide this value)**

## 3.7 Backlight Specification (independent driver board)

The backlight unit contains 1pcs light bar.

### 3.7.1 Electrical specification

| | Item | Symbol | | Condition | Spec | | | Unit | Note |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Min | Typ | Max | | |
| 1 | Input Voltage | VDDB | | - | 21.4 | 24 | 26.4 | VDC | - |
| 2 | Input Current | $I_{DDB}$ | | VDDB=24V | | 1.8 | | ADC | 1 |
| 3 | Input Power | $P_{DDB}$ | | VDDB=24V | | 44.2 | 48.5 | W | 1 |
| 4 | Inrush Current | $I_{RUSH}$ | | VDDB=24V | | | 5 | ADC | 2 |
| 5 | On/Off control voltage | $V_{BLON}$ | ON | VDDB=24V | 2 | - | 5.5 | VDC | - |
| | | | OFF | | 0 | - | 0.8 | | 3 |
| 6 | On/Off control current | $I_{BLON}$ | | VDDB=24V | - | - | 1.5 | mA | - |
| 7 | External PWM Control Voltage | V_EPWM | MAX | VDDB=24V | 2 | - | 3.3 | VDC | - |
| | | | MIN | VDDB=24V | 0 | - | 0.8 | | - |
| 8 | External PWM Control Current | I_EPWM | | VDDB=24V | - | - | 2 | mADC | - |
| 9 | External PWM Duty ratio | D_EPWM | | VDDB=24V | 5 | - | 100 | % | 5 |
| 10 | External PWM Frequency | F_EPWM | | VDDB=24V | 140 | 180 | 240 | Hz | - |
| 11 | DET status signal | DET | HI | VDDB=24V | Open Collector | | | VDC | 6 |
| | | | Lo | | 0 | - | 0.8 | VDC | 6 |
| 12 | Input Impedance | Rin | | VDDB=24V | 300 | | | Kohm | - |

Note 1 : Dimming ratio= 100% (MAX)（Ta=25±5℃, Turn on for 45minutes）

Note 2: Measurement condition Rising time = 20ms (VDDB : 10%~90%);

Note 3: When BLU off ( VDDB = 24V , VBLON = 0V) , IDDB (max) = 0.02A

Note 4: V_DIM voltage of 100% duty ratio =3.1V~3.3V means Burst Mode entry point should be located between 3.1V and 3.3V.

Note 5: Less than 5% dimming control is functional well and no backlight shutdown happened

Note 6: Normal : 0~0.8V ; Abnormal : Open collector

### 3.7.2 Input Pin Assignment

LED driver board connector : Cvilux CI0114M1HR0-NH

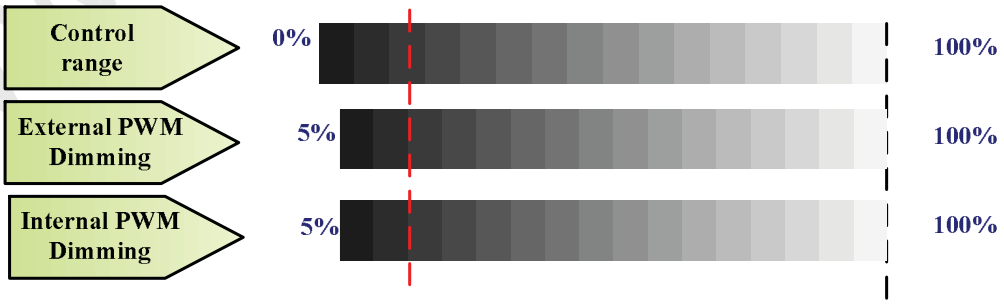
| Pin | Symbol | Description |
|---|---|---|
| 1 | VDDB | Operating Voltage Supply, +24V DC regulated |
| 2 | VDDB | Operating Voltage Supply, +24V DC regulated |
| 3 | VDDB | Operating Voltage Supply, +24V DC regulated |
| 4 | VDDB | Operating Voltage Supply, +24V DC regulated |
| 5 | VDDB | Operating Voltage Supply, +24V DC regulated |
| 6 | BLGND | Ground and Current Return |
| 7 | BLGND | Ground and Current Return |
| 8 | BLGND | Ground and Current Return |
| 9 | BLGND | Ground and Current Return |
| 10 | BLGND | Ground and Current Return |
| 11 | DET | BLU status detection<br>Normal: 0~0.8V; Abnormal: Open collector<br>(Recommend Pull high R > 10K, VDD = 3.3V) |
| 12 | VBLON | BLU On-Off Control:<br>High/Open(2~3.3V) : BL On<br>Low(0~0.8V/GND) : BL Off |
| 13 | NC | NC |
| 14 | PDIM | External PWM (5~100% Duty, open for 100%) |

(Note*) IF External PWM function less than 5% dimming ratio. Judge condition as below:

1.Backlight module must be lighted ON normally.

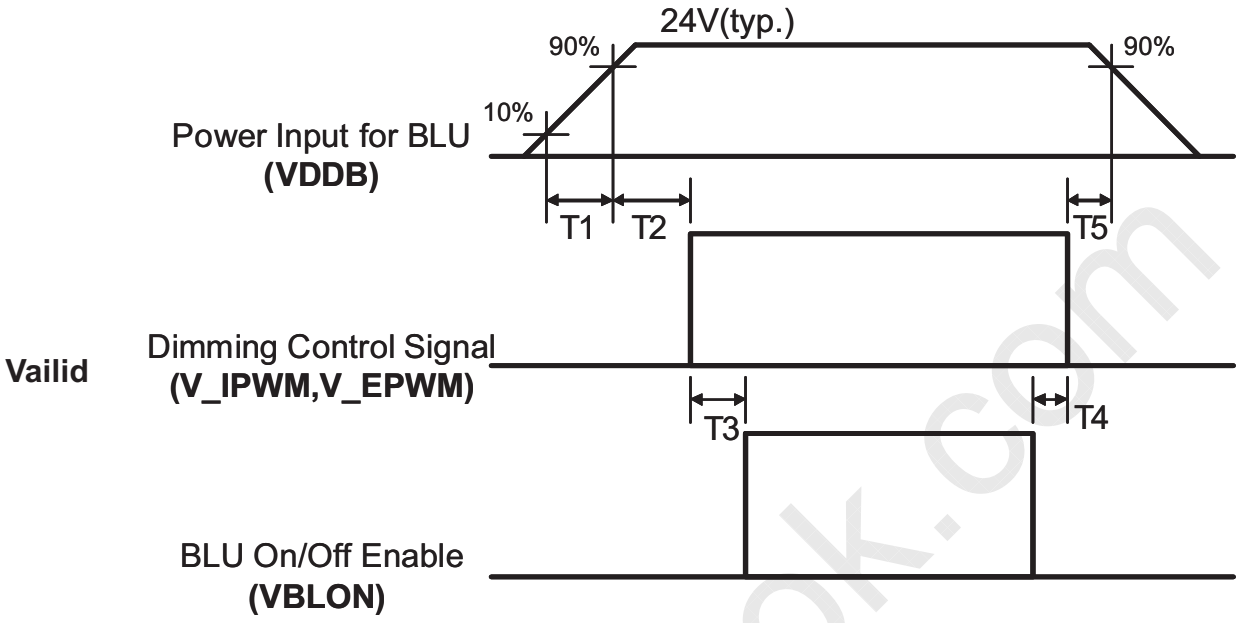
2.All protection function must work normally.

3.Uniformity and flicker could NOT be guaranteed

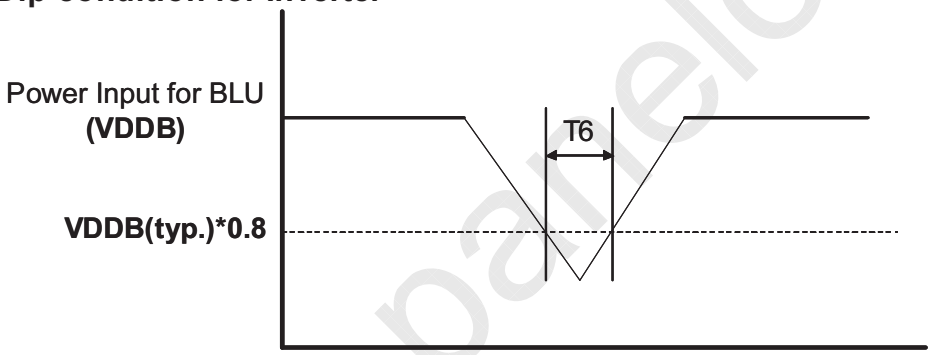



PWM Dimming : include Internal and External PWM Dimming

## Power Sequence for Backlight




## Dip condition for Inverter

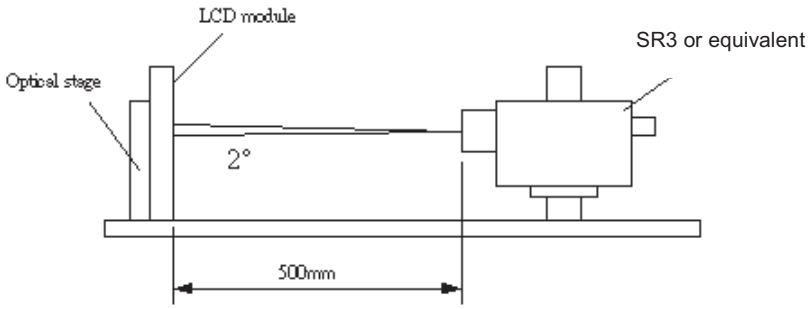



| Parameter | Value | | | Units |
|---|---|---|---|---|
| | Min | Typ | Max | |
| T1 | 20 | - | - | ms |
| T2 | 500 | - | - | ms |
| T3 | 250 | - | - | ms |
| T4 | 0 | - | - | ms |
| T5 | 1 | - | - | ms |
| T6 | - | - | 10 | ms |

# 4. Optical Specification

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 45 minutes in a dark environment at 25℃. The values specified are at an approximate distance 50cm from the LCD surface at a viewing angle of φ and θ equal to 0°.

**Fig.1 presents additional information concerning the measurement equipment and method.**




| Parameter | | Symbol | Values | | | Unit | Notes |
|---|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max | | |
| Contrast Ratio | | CR | 2400 | 3000 | -- | | 1 |
| Surface Luminance (White) | | $L_{WH}$ | 280 | 350 | -- | cd/m$^2$ | 2 |
| Luminance Variation | | $\delta_{WHITE(9P)}$ | -- | -- | 1.33 | | 3 |
| Response Time (G to G) | | Tγ | -- | 6.5 | -- | ms | 4 |
| Color Gamut | | NTSC | | 72 | | % | |
| Color Coordinates | | | | | | | |
| | Red | $R_X$ | Typ.-0.03 | 0.630 | Typ.+0.03 | | |
| | | $R_Y$ | | 0.330 | | | |
| | Green | $G_X$ | | 0.320 | | | |
| | | $G_Y$ | | 0.620 | | | |
| | Blue | $B_X$ | | 0.150 | | | |
| | | $B_Y$ | | 0.040 | | | |
| | White | $W_X$ | | 0.280 | | | |
| | | $W_Y$ | | 0.290 | | | |
| Viewing Angle | | | | | | | 5 |
| | x axis, right(φ=0°) | $\theta_r$ | -- | 89 | -- | degree | |
| | x axis, left(φ=180°) | $\theta_l$ | -- | 89 | -- | degree | |
| | y axis, up(φ=90°) | $\theta_u$ | -- | 89 | -- | degree | |
| | y axis, down (φ=270°) | $\theta_d$ | -- | 89 | -- | degree | |

Note:

1. Contrast Ratio (CR) is defined mathematically as:

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance of } L_{on5}}{\text{Surface Luminance of } L_{off5}}$$

2. Surface luminance is luminance value at point 5 across the LCD surface 50cm from the surface with all pixels displaying white. From more information see FIG 2. When lamp current $I_H$ = 11mA. $L_{WH}$=Lon5 where Lon5 is the luminance with all pixels displaying white at center 5 location.
3. The variation in surface luminance, δWHITE is defined (center of Screen) as:

   $\delta_{WHITE(9P)}$= Maximum($L_{on1}$, $L_{on2}$,…,$L_{on9}$)/ Minimum($L_{on1}$, $L_{on2}$,…$L_{on9}$)
4. Response time $T_\gamma$ is the average time required for display transition by switching the input signal for five luminance ratio (0%,25%,50%,75%,100% brightness matrix) and is based on $F_V$=60Hz to optimize.

| Measured Response Time | | Target | | | | |
|---|---|---|---|---|---|---|
| | | 0% | 25% | 50% | 75% | 100% |
| Start | 0% | | 0% to 25% | 0% to 50% | 0% to 75% | 0% to 100% |
| | 25% | 25% to 0% | | 25% to 50% | 25% to 75% | 25% to 100% |
| | 50% | 50% to 0% | 50% to 25% | | 50% to 75% | 50% to 100% |
| | 75% | 75% to 0% | 75% to 25% | 75% to 50% | | 75% to 100% |
| | 100% | 100% to 0% | 100% to 25% | 100% to 50% | 100% to 75% | |

The response time is defined as the following figure and shall be measured by switching the input signal for "any level of grey(bright) " and "any level of gray(dark)".

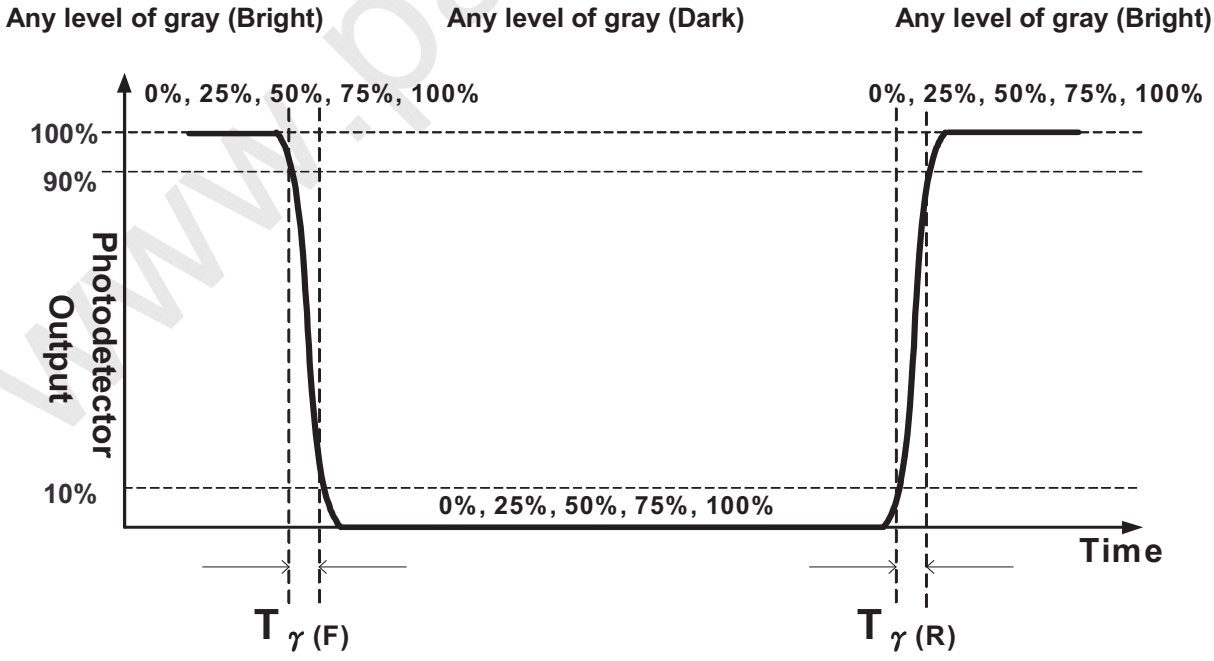
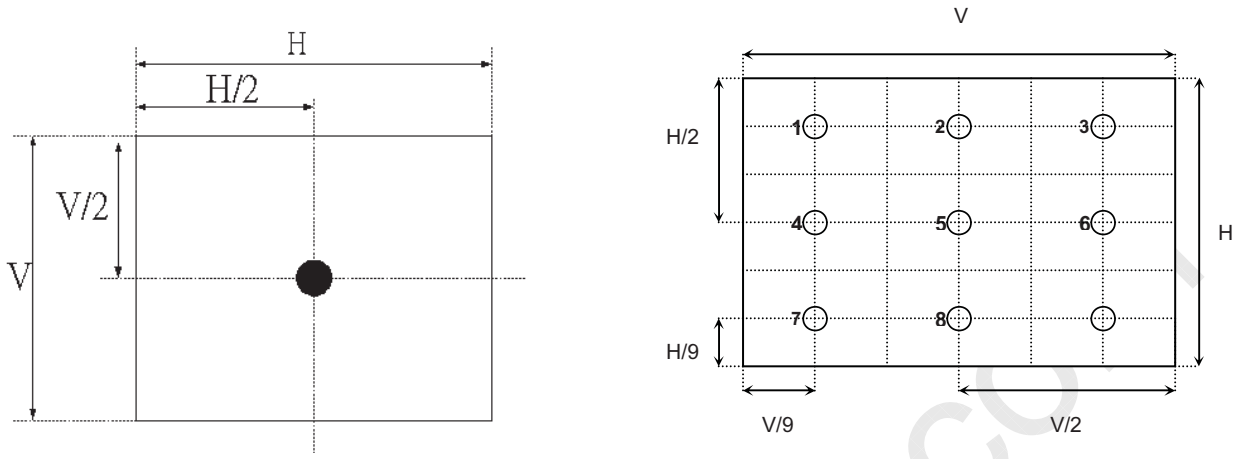
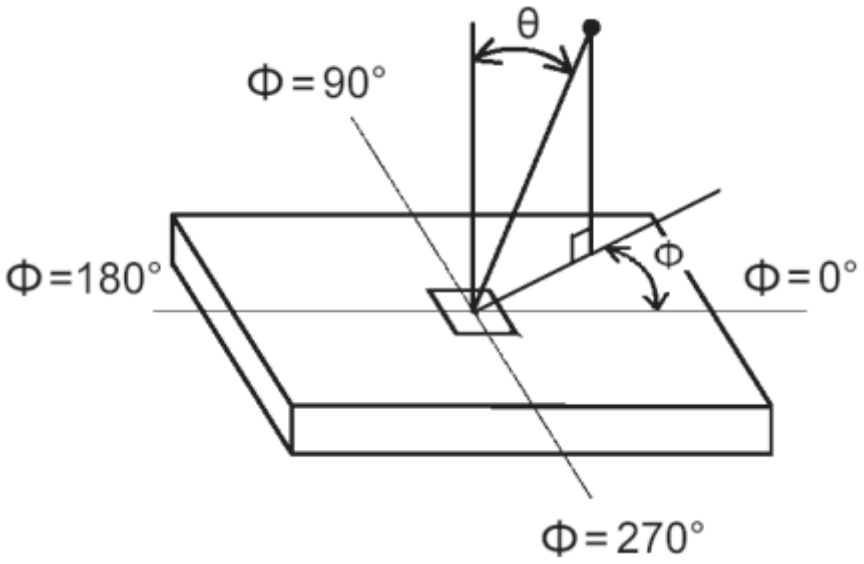


**FIG. 2 Luminance**




5. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG3.

**FIG.3 Viewing Angle**

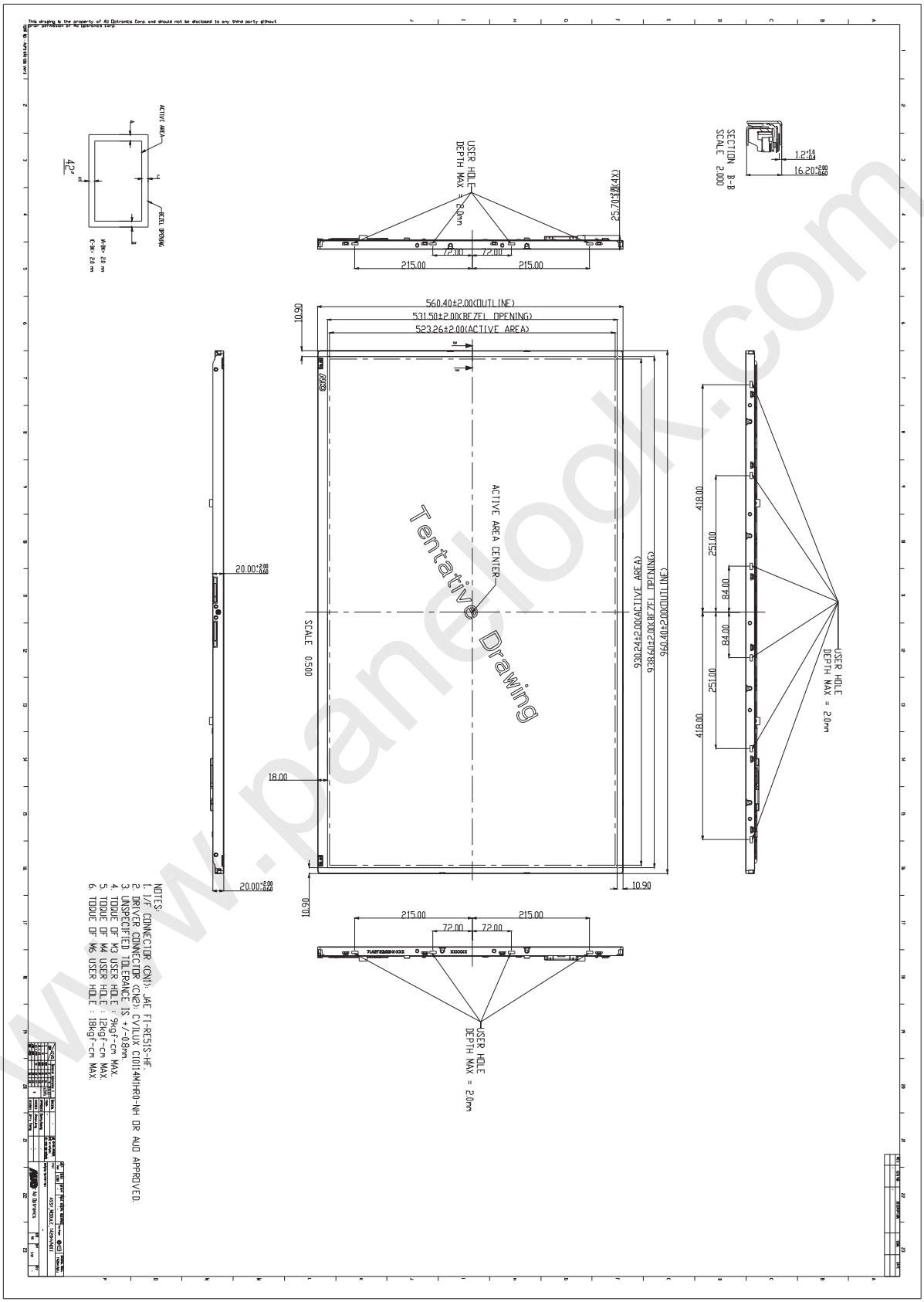


# 5. Mechanical Characteristics

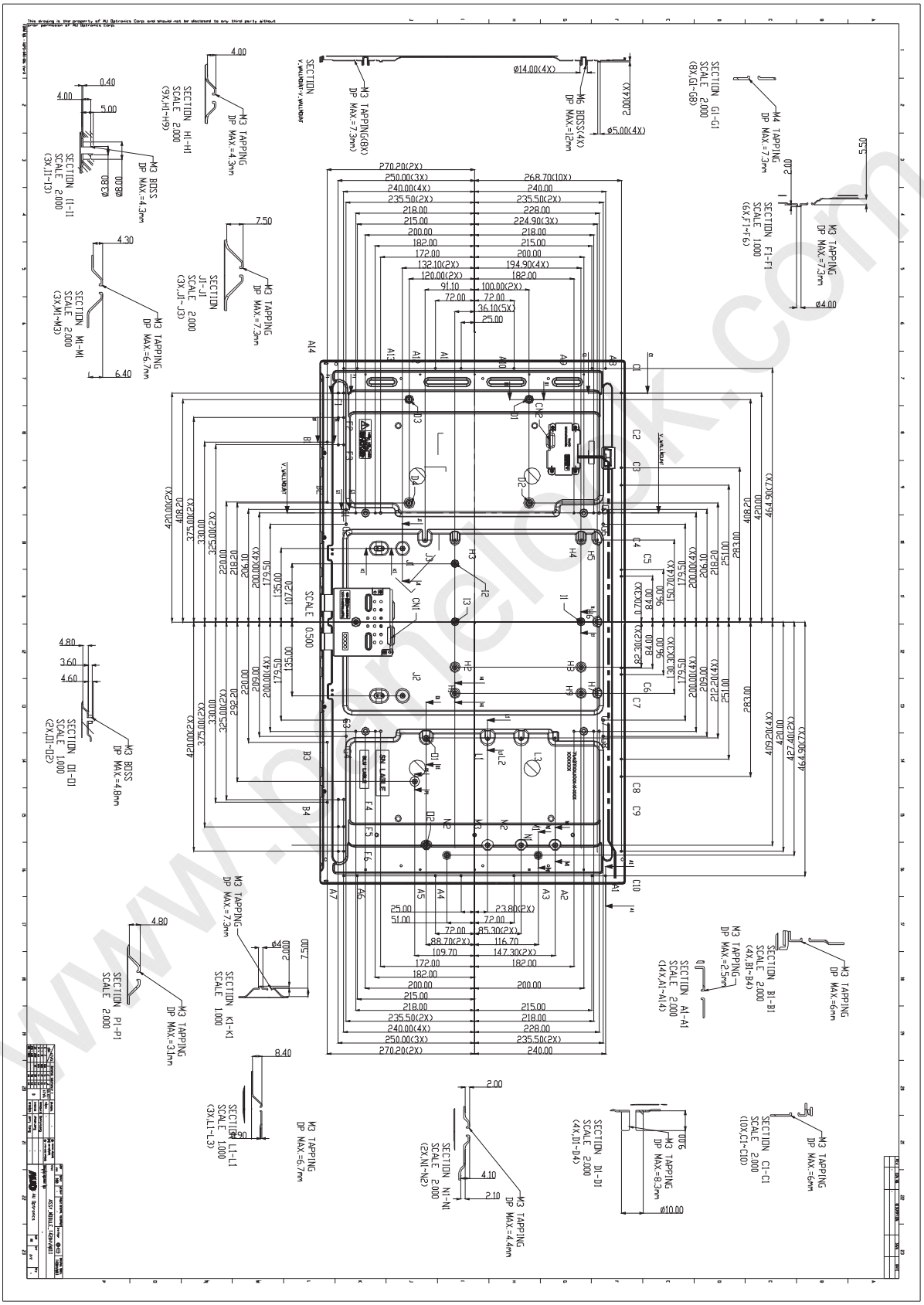
The contents provide general mechanical characteristics for the model T420HVN01.1. In addition the figures in the next page are detailed mechanical drawing of the LCD.

| Item | | Dimension | Unit | Note |
|---|---|---|---|---|
| Outline Dimension | Horizontal | 960.4 | mm | |
| | Vertical | 560.4 | mm | |
| | Depth (Dmin) | 9.9 | mm | |
| | Depth (Dmax) | 25.7 | mm | |
| Weight | 8900 | | g | |

# Front View



# Back View



# 6. Reliability Test Items

| | Test Item | Q'ty | Condition |
|---|---|---|---|
| 1 | High temperature storage test | 3 | 60℃, 300hrs |
| 2 | Low temperature storage test | 3 | -20℃, 300hrs |
| 3 | High temperature operation test | 3 | 50℃, 300hrs |
| 4 | Low temperature operation test | 3 | -5℃, 300hrs |
| 5 | Vibration test (non-operation) | 3 | Wave form: random<br>Vibration level : 1.0G RMS<br>Bandwidth : 10-300Hz<br>Duration : X,Y,Z 10min per axes<br>X,Y,Z: Horizontal, face up |
| 6 | Shock test (non-operation) | 3 | Shock level<br>50G,11ms in ±X,Y,Z axis<br>Waveform: half sine wave<br>Direction: One time each direction |
| 7 | Vibration test (With carton) | 1(PKG) | Random wave (1.05Grms 10~200Hz)<br>Duration : X,Y,Z 10min per axes |
| 8 | Drop test (With carton) | 1(PKG) | Height: 25.4cm (ASTMD4169-I)<br>Surround four flats(Front,Rear,Left,Right flat) one time,<br>Bottom flat two times. |



# 7. International Standard

## 7.1 Safety

(1) UL 60950-1, UL 60065; Standard for Safety of Information Technology Equipment Including electrical Business Equipment.

(2) IEC 60950-1 : 2001, IEC 60065:2001 ; Standard for Safety of International Electrotechnical Commission

(3) EN 60950 : 2001+A11, EN 60065:2002+A1:2006; European Committee for Electrotechnical Standardization (CENELEC), EUROPEAN STANDARD for Safety of Information Technology Equipment Including Electrical Business Equipment.

## 7.2 EMC

(1) ANSI C63.4 “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electrical Equipment in the Range of 9kHz to 40GHz. “American National standards Institute(ANSI), 1992

(2) C.I.S.P.R “Limits and Methods of Measurement of Radio Interface Characteristics of Information Technology Equipment.” International Special committee on Radio Interference.

(3) EN 55022 “Limits and Methods of Measurement of Radio Interface Characteristics of Information Technology Equipment.” European Committee for Electrotechnical Standardization. (CENELEC), 1998

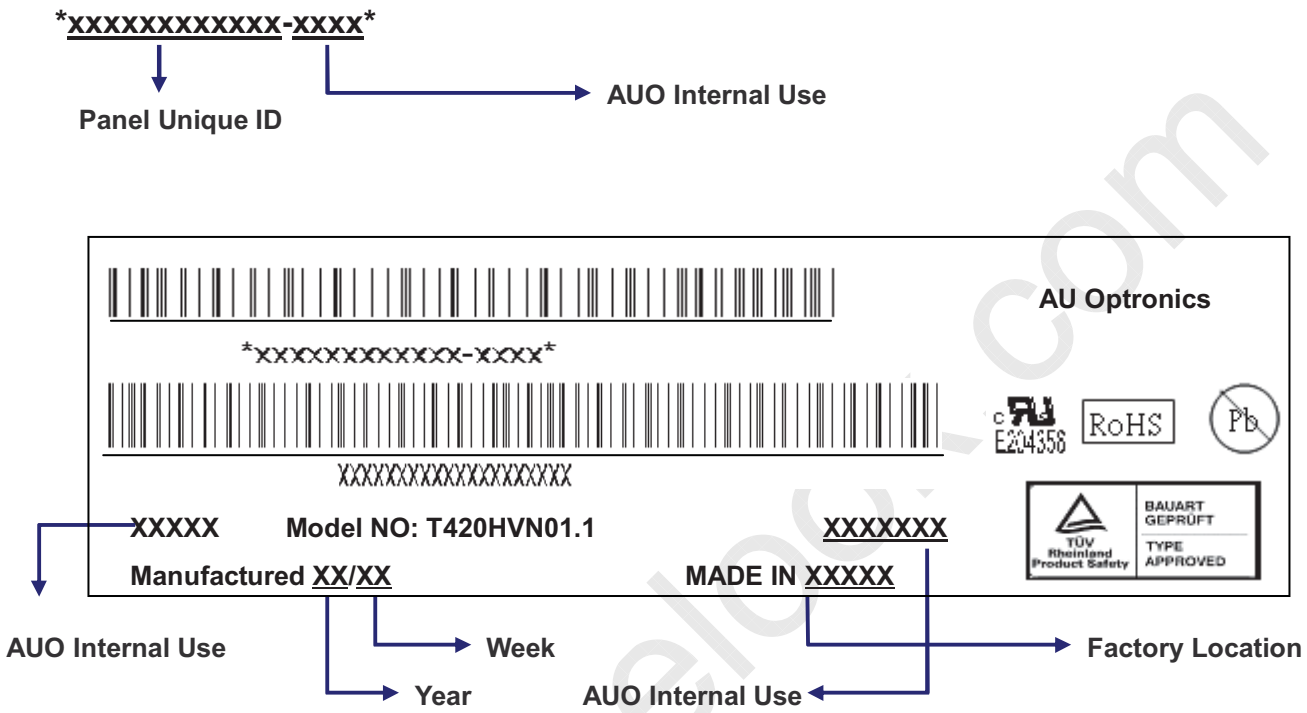


# 8. Packing

## 8-1 DEFINITION OF LABEL:

### A. Panel Label:



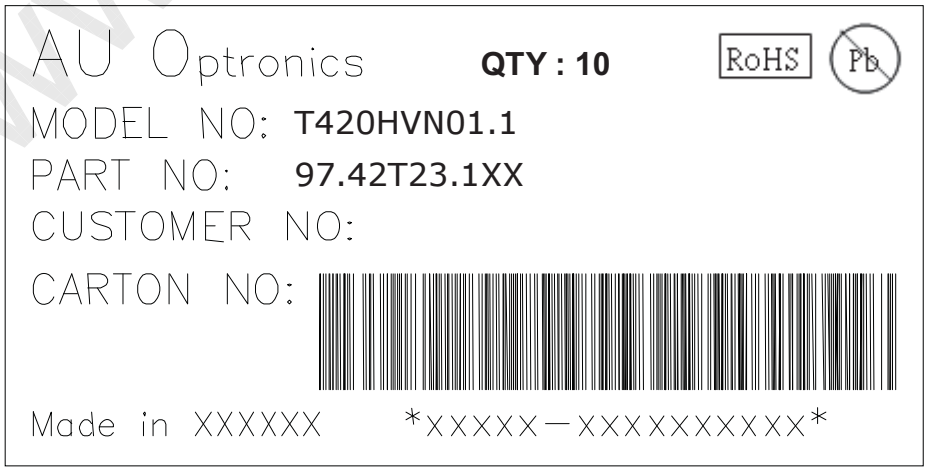

**Green mark description**

(1) For Pb Free Product, AUO will add Pb for identification.

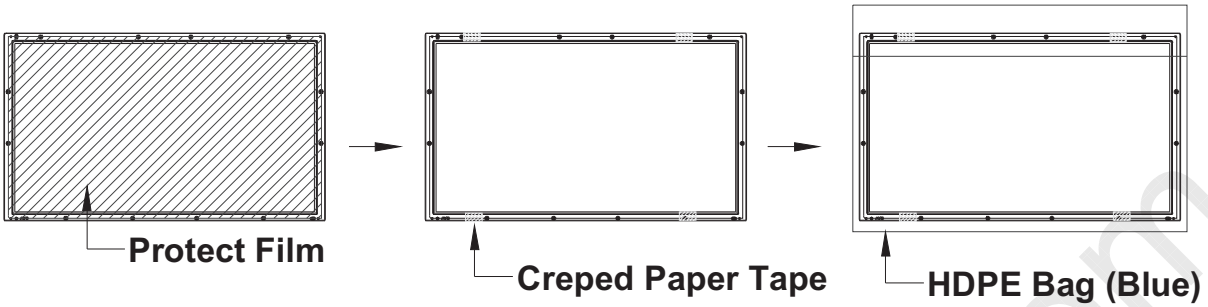
(2) For RoHs compatible products, AUO will add RoHS for identification.

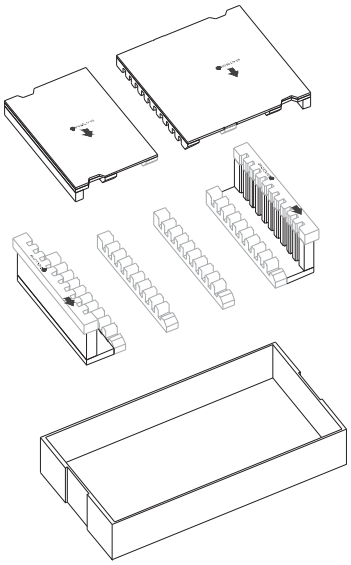
Note: The green Mark will be present only when the green documents have been ready by AUO internal green team. (definition of green design follows the AUO green design checklist.)

### B. Carton Label:

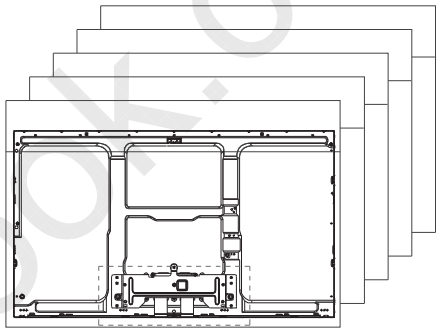


## 8-2 PACKING METHODS:



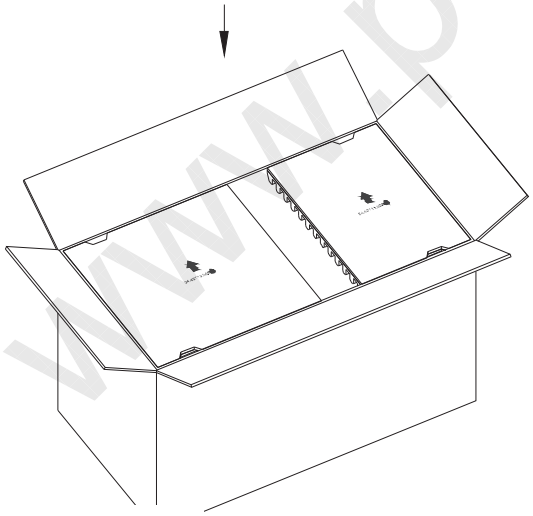



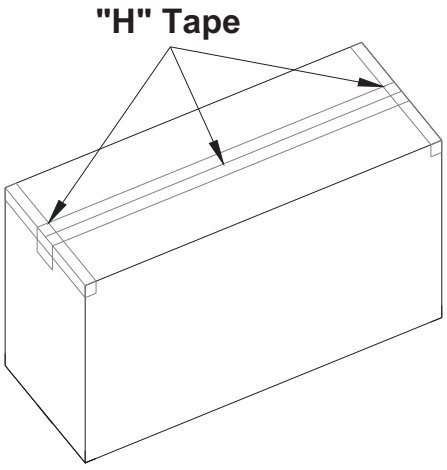
Cushion Set



Packing Way：Panel Top Side Down

( 10 ) Pcs Modules

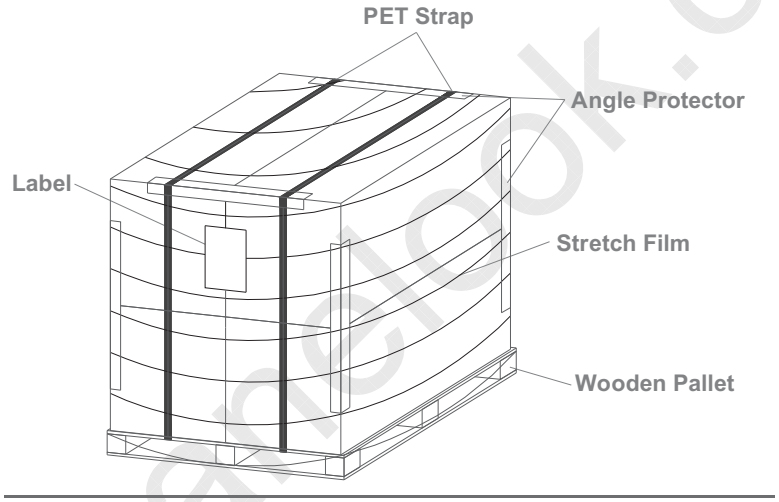





( 10 ) Pcs / 1 Carton

## 8-3 Pallet and Shipment Information

| | Item | Specification | | | Packing Remark |
|---|---|---|---|---|---|
| | | Qty. | Dimension | Weight (kg) | |
| 1 | Packing BOX | 10 | 1050(L)*560(W)*640(H) | 95 | Carton=2.53kg<br>Cushion=2.13kg |
| 2 | Pallet | 1 | 1150(L)*1070(W)*132(H) | 14.5 | |
| 3 | Boxes per Pallet | 2 boxes/pallet | | | |
| 4 | Panels per Pallet | 20pcs/pallet | | | |
| | Pallet after packing | 20 | 1150(L)*1070(W)*772(H) | 204.5 | |




**Single~~One~~ pallet packaging illustration**

# 10. PRECAUTIONS

Please pay attention to the followings when you use this TFT LCD module.

## 9-1 MOUNTING PRECAUTIONS

(1) You must mount a module using holes arranged in four corners or four sides.

(2) You should consider the mounting structure so that uneven force (ex. twisted stress) is not applied to module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.

(3) Please attach the surface transparent protective plate to the surface in order to protect the polarizer. Transparent protective plate should have sufficient strength in order to the resist external force.

(4) You should adopt radiation structure to satisfy the temperature specification.

(5) Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter cause circuit broken by electro-chemical reaction.

(6) Do not touch, push or rub the exposed polarizer with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment. Do not touch the surface of polarizer for bare hand or greasy cloth. (Some cosmetics are detrimental to the polarizer.)

(7) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzene. Normal-hexane is recommended for cleaning the adhesives used to attach front/ rear polarizer. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer.

(8) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.

(9) Do not open the case because inside circuits do not have sufficient strength.

## 9-2 OPERATING PRECAUTIONS

(1) The device listed in the product specification sheets was designed and manufactured for TV application

(2) The spike noise causes the mis-operation of circuits. It should be lower than following voltage: V=±200mV(Over and under shoot voltage)

(3) Response time depends on the temperature. (In lower temperature, it becomes longer..)

(4) Brightness of CCFL depends on the temperature. (In lower temperature, it becomes lower.) And in lower temperature, response time (required time that brightness is stable after turned on) becomes longer.

(5) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.

(6) When fixed patterns are displayed for a long time, remnant image is likely to occur.

(7) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall

be done by system manufacturers. Grounding and shielding methods may be important to minimize the interface.

## 9-3 ELECTROSTATIC DISCHARGE CONTROL

Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wristband etc. And don't touch interface pin directly.

## 9-4 PRECAUTIONS FOR STRONG LIGHT EXPOSURE

Strong light exposure causes degradation of polarizer and color filter.

## 9-5 STORAGE

When storing modules as spares for a long time, the following precautions are necessary.

(1) Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5℃ and 35℃ at normal humidity.

(2) The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.

## 9-6 HANDLING PRECAUTIONS FOR PROTECTION FILM

(1) The protection film is attached to the bezel with a small masking tape. When the protection film is peeled off, static electricity is generated between the film and polarizer. This should be peeled off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition, etc.

(2) When the module with protection film attached is stored for a long time, sometimes there remains a very small amount of glue still on the bezel after the protection film is peeled off.

(3) You can remove the glue easily. When the glue remains on the bezel or its vestige is recognized, please wipe them off with absorbent cotton waste or other soft material like chamois soaked with normal-hexane.

